

WE CLAIM:

1. A method for treating a separation facility including a plurality of membranes, the method comprising:
 - (a) providing liquid flow through the plurality of membranes;
 - (b) treating the plurality of membranes with a multiple phase treatment composition comprising a gaseous phase and a liquid phase at a volumetric ratio of the gaseous phase to the liquid phase of at least about 5:1; and
 - (c) providing a liquid flow through the plurality of membranes.
2. A method according to claim 1, wherein the multiple phase treatment composition comprises a sufficient amount of liquid phase to wet the plurality of membranes.
3. A method according to claim 1, wherein the gaseous phase of the cleaning solution comprises at least one of air and carbon dioxide.
4. A method according to claim 3, wherein the gaseous phase comprises air and a treatment effective amount of at least one of ozone and carbon dioxide.
5. A method according to claim 1, wherein the volumetric ratio of the gaseous phase to the liquid phase is between about 5:1 and about 75,000:1.
6. A method according to claim 1, wherein the liquid phase flow rate in the multiple phase treatment composition comprises at least 0.1 gal/min.
7. A method according to claim 1, wherein the liquid phase flow rate in the multiple phase treatment composition is less than about 15 gal/min.

8. A method according to claim 1, wherein the multiple phase treatment composition is applied to the plurality of membranes in a separation facility comprising an inlet, and the gaseous volume at the inlet is about 10 SCFM to about 1,000 SCFM.
9. A method according to claim 1, wherein the plurality of membranes are provided within a separation facility, and the pressure of the multiple phase treatment composition within the treatment facility is below the bubble point for the plurality of membranes according to ASTM F316-03.
10. A method according to claim 1, wherein the plurality of membranes provided within the separation facility exhibit a total membrane area of at least about 200 m².
11. A method according to claim 1, wherein the liquid phase of the multiple phase treatment composition comprises an enzyme.
12. A method according to claim 1, wherein the liquid phase of the multiple phase treatment composition comprises a surfactant.
13. A method according to claim 1, wherein the liquid phase of the multiple phase treatment composition comprises a pH adjusting agent.
14. A method according to claim 1, wherein the step (a) of providing liquid flow through the plurality of membranes comprises displacing product from the plurality of membranes and rinsing the membranes to remove loose soil.
15. A method according to claim 1, wherein the step (c) of providing a liquid flow through the plurality of membranes comprises diluting the liquid phase of the multiple phase treatment composition to provide a liquid treatment composition, and circulating the liquid treatment composition through the plurality of membranes in the separation facility.

16. A method according to claim 1, further comprising a step of:

(a) treating the plurality of membranes with a second multiple phase treatment composition comprising a gaseous phase and a liquid phase at a volumetric ratio of the gaseous phase to the liquid phase of at least about 5:1.

17. A method according to claim 16, further comprising:

(a) diluting the gaseous phase of the second multiple phase treatment composition to provide a second liquid composition, and recirculating the second liquid composition through the plurality of membranes.

18. A method for treating a separation facility including a separation membrane, the method comprising:

(a) displacing product from the separation membrane;

(b) treating the separation membrane with a multiple phase treatment composition comprising a gaseous phase and a liquid phase at a volumetric ratio of the gaseous phase to provide the liquid phase on the separation membrane;

(c) diluting the liquid phase on the separation membrane to provide liquid composition; and

(d) recirculating the liquid composition in the separation facility.

19. A method according to claim 18, wherein the step of displacing product comprises introducing a liquid flow into the separation facility for displacing product from the separation membrane.

20. A method according to claim 18, wherein the step of displacing product comprises introducing a composition comprising gaseous air into the separation facility for displacing product from the separation membrane.

21. A method according to claim 20, wherein the gaseous air is provided as part of a multiple phase treatment composition.

22. A method for treating membranes comprising:

- (a) rinsing a membrane with a first liquid rinse composition;
- (b) treating the membranes with a first multiple phase treatment composition comprising a gaseous phase and a liquid phase at a volumetric ratio of the gaseous phase to the liquid phase of at least about 5:1;
- (c) flooding the membrane with water to provide a first liquid treatment composition and recirculating the first liquid treatment composition within the membrane;
- (d) removing the first liquid treatment composition from the membrane; and
- (e) treating the membrane with a second multiple phase treatment composition comprising a gaseous phase and a liquid phase at a volumetric ratio of the gaseous phase to the liquid phase of at least about 5:1.

23. A method for cleaning a filtration system comprising:

- (a) removing liquid product from the filtration system and recovering at least a part of the liquid product;
- (b) flooding the filtration system with a first aqueous media to remove at least a portion of solids in the filtration system;
- (c) flushing the filtration system with a gaseous media to remove at least a portion of the first aqueous media;
- (d) treating the filtration system with a multiple phase treatment composition comprising a gaseous phase and a liquid phase;
- (e) flooding the filtration system with a second aqueous media; and

(f) rinsing the filtration system.

24. A method according to claim 23, wherein the liquid product comprises a food product.

25. A process according to claim 23, wherein the liquid product comprises a dairy product.

26. A method according to claim 23, wherein the filtration system comprises a spiral wound membrane.

27. A method according to claim 23, wherein the step of removing liquid product comprises displacing the liquid product with water.

28. A method according to claim 23, wherein the first aqueous media comprises water.

29. A method according to claim 23, wherein the first aqueous media comprises an alkaline solution having a pH of between about 8 and about 13.

30. A method according to claim 23, wherein the step of flooding the filtration system with a first aqueous media comprises circulating the first aqueous media within the filtration system for at least about 10 minutes.

31. A method according to claim 23, wherein the step of flushing the filtration system with a gaseous media comprises flushing for less than about 5 minutes.

32. A method according to claim 22, wherein the step of treating with a multiple phase treatment composition comprises applying the multiple phase treatment composition for at least about 3 minutes.

33. A method according to claim 23, further comprising a step of soaking after the step of treating with a multiple phase treatment composition and before the step of flooding the filtration system with a second aqueous media.

34. A method according to claim 33, wherein the step of soaking takes place for at least about 1 minute.

35. A method according to claim 23, wherein the step of flooding the filtration system with a second aqueous media comprises recirculating the second aqueous media for between about 5 minutes and about 15 minutes.

36. A method according to claim 23, wherein the second aqueous media comprises water having a temperature of between about 100°F and about 120°F.

37. A separation facility comprising:

- (a) a plurality of membranes provided in vessels and constructed for providing separation of a feed product;
- (b) multiple phase flow equipment provided for delivering a multiple phase treatment composition to the plurality of membranes in the vessels; and
- (c) liquid flow equipment provided for delivering liquid flow to the plurality of membranes in the vessels.

38. A multiple phase treatment composition comprising a gaseous phase and a liquid phase, wherein the gaseous phase and the liquid phase are at a volumetric ratio of between about 5:1 and about 75,000:1 and provided at a liquid phase flow rate of about 0.1 gal/min. to about 15 gal/min., and wherein the gaseous phase comprises air and the liquid phase comprises an active concentration of at least about 1 wt.%.

39. A multiple phase treatment composition according to claim 38, wherein the liquid phase comprises an active concentration of at least about 2 wt.%.

40. A multiple phase treatment composition according to claim 38, wherein the liquid phase comprises an active concentration of at least about 5 wt.%.

39. A separation facility according to claim 37, wherein the plurality of membranes provide a membrane surface area of about 200 m² to about 10,000 m².